The ASSOCIATION OF LUNAR AND PLANETARY OBSERVERS

Strolling Astronomer

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In This Issue

THE STROLLING ASTRONOMER
1203 North Alameda Street
Las Cruces, New Mexico

ANNOUNCEMENTS

List of Clusters and Nebulae. Mr. J. Russell Smith, Skyview Observatory, Eagle Pass, Texas has available for distribution 100 mimeographed copies of "Nebulae and Clusters for the Telescope," a list of clusters and nebulae compiled by Mr. J. B. Duryea and published in **Popular Astronomy** in March, 1936. Mr. Smith will send a copy of this list to anyone who writes to him and encloses **six cents in postage** to cover mailing costs. We hope that many of our readers will take advantage of Mr. Smith's generous offer and will observe the celestial beauty spots his list describes. There is material here, and in a compact form ideal for use at the telescope, to give many pleasant hours at the eyepiece.

The A.L.P.O. a Member of the Astronomical League. On pg. 25 of our March-April issue we told of our intention to apply for membership in the Astronomical League. We are glad to report to our members that this application was accepted by the Council of the League during the National Convention at Madison, Wisconsin on July 1-4, 1954 and that the Association of Lunar and Planetary Observers has accordingly become an affiliate member of the Astronomical League. This type of membership is intended for observing-groups and is also held by the American Association of Variable Star Observers. We are naturally very glad to belong to the League and look forward to participating in the activities of this large and growing society of amateurs.

New Names on the Moon. We have learned that Dr. H. P. Wilkins, the Lunar Director of the British Astronomical Association, has recently added these names to the surface of our satellite:

1. Archimedes A (Section IV of the Wilkins map) has been named Gant for Dr. James Q. Gant of Washington, D. C., a keen lunar observer and a charter member of the A.L.P.O.

2. Kastner A (Section XI of the Wilkins map) has been named Watts for Dr. C. B. Watts of the U. S. Naval Observatory, who has done much work on the moon's limb.

We congratulate these gentlemen on the distinction they have received.

MARS, 1954—REPORT NUMBER 1, PART 1

By D. P. AVIGLIANO

This report is based on A.L.P.O. observations so far received covering the period of October 1953 to June 17, 1954. The following observers made this report possible. The majority of them sent drawings.

OBSERVER	INSTRUMENTS	STATIONS
Mr. R. M. Adams	4-inch refr.	Neosho, Mo.
Mr. D. P. Avigliano	8-inch refl., 24-inch refr.*	Sierra Madre, Calif. and Flagstaff, Ariz.
Mr. Charles F. Capen, Jr.	24-inch refr.* and 9 and 12-inch refls.	Flagstaff, Arizona and Las Cruces, New Mexico
Mr. Jackson T. Carle	8-inch refl.	Fresno, California
Mr. Thomas R. Cave, Jr.	8 and 12½-inch refls.	Long Beach, California
Mr. Thomas A. Cragg	6-inch refr.**	Mt. Wilson, California
Mr. René Doucet	5-inch refr.	Three Rivers, Quebec, Canada
Mr. Lonzo Dove	4-inch refr.	Broadway, Virginia
Mr. Theodore R. Hake	6 and 8-inch refls.	York, Pennsylvania

OBSERVER	INSTRUMENTS	STATIONS
Mr. A. K. Herring	8-inch refl.	South Gate, California
Mr. Lyle T. Johnson	10-inch refl. (Photographs)	La Plata, Maryland
Mr. Frank B. Mayes	6-inch refl.	Redondo Beach, California
Mr. Clark C. McClelland	13-inch refr.***	Pittsburgh, Pennsylvania
Mr. Robert L. Miles	6-inch refl.	Woodland, California
Mr. Owen C. Ranck	6-inch refl.	Allentown, Pennsylvania
Mr. Clyde H. Ray, III	3½-inch refl.	Waynesville, N. C.
Mr. Stanley R. Robinson	6-inch refl.	Oakland, California
Mr. Tsuneo Saheki	8-inch refl.	Osaka, Japan
Mr. F. Suler	5-inch refl.	Richmond, Texas
Mr. Neil Stockton	4-inch refl.	Fresno, California
Mr. John E. Westfall	4-inch refr.	Oakland, California
Mr. S. P. Young	12½-inch refl.	Albuquerque, New Mexico

* 24-inch refractor of the Lowell Observatory
** 6-inch refractor of the Mt. Wilson Observatory
*** 13-inch refractor of the Allegheny Observatory

During this first period the diameter of Mars increased from nearly 4 to over 21 seconds of arc. The areocentric longitude of the sun or L. S. increased from about 60° to 180° so that during this period the southern hemisphere of the planet went from its late autumn through and up to the end of its winter; the northern hemisphere went from its late spring through and up to the end of its summer.

The earliest drawing yet received was made on December 24, 1953.

Part 1 of this first report on Mars will consist of a general description of the main Martian features as seen by our observers during this earlier period. A good map of Mars will help in following these discussions. All dates and times are in U.T.

GENERAL C. M. 345°. Figure 1, a drawing by T. R. Cave, Jr., shows Mars with the C.M. at 338°. Among the features on this drawing we should note are the several canals and the three most prominent oases, the Coloe Palus, the Ismenius Lacus (with two centers), and the Oxia Palus at the tip of the Margaritifer Sinus. The absence of the Pandorae Fretum and the presence of a shaded area between the canals Euphrates and Hiddekel should also be noted. This latter shaded area is shown to extend up to the Sabaeus Sinus into the region of Edom, which is normally seen as a brighter region. A narrow melt band is seen around the S. polar cap, and some knots are depicted as already forming in this band.

In this general area of the planet the Sabaeus Sinus, one of the three darkest features of the planet during the period of this report (the other two being the N. portion of the Syrtis Major and the Trivium Charontis-Cerberus I region), was seen by all of the observers as prominent. In color the Sabaeus Sinus was noted as grey or greenish grey by most of the observers; Cave noted it as a dark grey-chocolate brown, and Avigliano usually saw it as a very dark greenish grey. To the majority of the observers the general S. Mare regions in this area were greyish or greenish grey; the dark areas in the N. were greyish in tone; while the desert areas, when seen with the best transparency, were noted as orange to orange-yellow.

The Ismenius Lacus and two of its connecting canals, the Protonilus and the Deuteronilus, were well seen from the earlier dates. At the latter part of the period covered by this report the Deuter-

onilus is shown on drawings by Westfall and Suler with 4 and 5-inch apertures respectively. The Gehon is also frequently shown by those with somewhat larger apertures.

Experienced observers under good conditions were able to detect the doubling of the Forks of Aryn. Capen as early as April 4 using the Lowell 24-inch refractor at 16 inches effective aperture shows the forks double (Figure 2). At this time Mars presented a disc of only 10″.0 in diameter. Cave reports the Forks as easily doubled. With comparatively poor seeing Avigliano was only able to suspect the doubling at best, and of the rest of the observers only Westfall detected the doubling on June 17 with the disc at 21″.0 (4-inches aperture).

GENERAL C.M. 40°. Figure 2 by Charles F. Capen, Jr. shows Mars with the C.M. at 27°. Of the canals shown note the appearance of the Nilokeras I and Nilokeras II with the canal Phryxus running diagonally between them, the area between the two components of the Nilokeras being shaded. The canal Jamuna was also distinctly seen as a band-like marking extending its full length, although on the preceding three days (April 1, 2, and 3) Capen had found the Jamuna invisible. This would imply that either an obscuring haze had been over this area or that the canal itself gained rapidly in prominence (or both). The late Prof. W. H. Pickering, in his past work on Mars, noted canals that became visually prominent in a matter of hours. The detailed appearance of any canals that appear in an area where nothing was detected in a preceding observation should be given careful attention as well as should their appearances at a later date. Work of this nature would, of course, require an adequate instrument, a location of favorable seeing, and good to excellent conditions. Figure 2 also shows the E. end of the Pandorae Fretum, its outline being somewhat indistinct along the border of the Deucalionis Regio. In contrast to later observations by Cave (Figure 1) and other observers this drawing would appear to show a fading out of the Pandorae between early April (L. S. 140°) and the

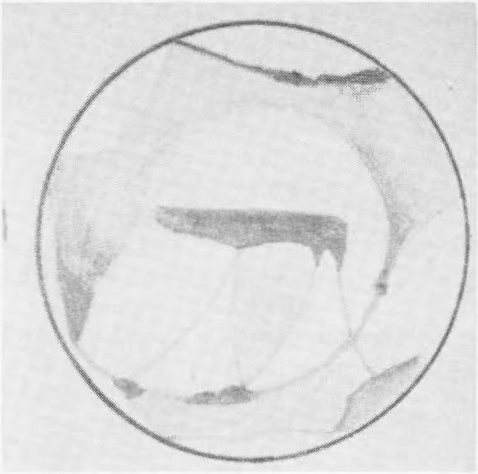

Figure 1. Mars
June 17, 1954. 6^h 10^m U.T.
8-inch refl., 210X and 285X.
C.M.=338° Dia.=21″.0
T. R. Cave, Jr.

Figure 2. Mars.
April 4, 1954. 12^h 00^m U.T.
24-inch refr. used at 16-inches of aperture
240X with amber filter, 310X.
C.M.=27° Dia.=10″.0
C. F. Capen, Jr.

middle of June (L. S. 179°); however, more early observation reports of this area are needed before definite statements can be made regarding such a fading. Also, a perusal of the drawings of this area that are available shows the possibility of periodic widespread obscurations of this area.

Of the lighter regions shown in Figure 2 we see: the S. polar cap as bright but with an indefinite outline, a white area extending from the S. polar region over Thaumasia to the Solis Lacus (through which the Ambrosia and Bathys canals can not be seen), the region of Noachis as "very bright, white and large" and separate from the S. polar cap, a "weak white area" E. of the Ganges canal in the region of Candor, and the N. polar cap as "very small but bright". The Thaumasia and Noachis white areas had rather indefinite outlines. On April 2 Capen had also seen the Noachis area as a large white zone separated from the S. polar cap by a small dark green band. The Aurorae Sinus appeared to Capen a dark green color. At the observation of April 4 Capen did not see the Fons Juventae; but it was noted, minus its connecting canals, by Clyde Tombaugh, who was also observing at the time (the planet's disc being only 10″.0 in diameter).

In this general area of the planet most of the observers show the Niliacus Lacus-Mare Acidalium as quite prominent. Cave and Avigliano in good seeing show the break in this area—the Achillis Pons—and Cave shows detail within the Mare Acidalium. Cragg reports the Mare Acidalium as lacking its past prominence, an effect due, possibly, to the somewhat foreshortened view we had of this area at the dates of this report.

The colors in the S. Maria on this side of the planet were noted by most of the observers as greenish or greenish-grey. Cave called the Margaritifer Sinus and the Aurorae Sinus emerald green. The desert areas were generally reported as from orange through yellow in tint.

Of the number of canals that were seen in this general area the most stable and easily observable were the Ganges, the Nilokeras, and the Indus. The small oasis at the tip of the Margaritifer Sinus, the Oxia Palus, was seen by Cave (Fig. 1), Capen, and Avigliano.

GENERAL C.M. 90°. Figure 3, by Cave, shows the C.M. at 82°. In this view the Solis Lacus with several of its connecting canals is shown. Also prominent is the Fons Juventae and its connecting canal, Baetis. On June 11 in an extremely fine view Avigliano saw the Fons Juventae much as Cave described it. " . . . like a small drop of ink . . . "; the canal, Baetis, was very narrow and well defined on this occasion. The shadings shown on the E. portion of the planet mark the beginning of one of the more difficult regions of the planet (the meridians between about 110° and 180°).

A prominent oasis, seen by nearly all of the observers, was the Lunae Lacus (shown on Fig. 3 near the N.W. edge of the disc). The Ascraeus Lacus was seen by several of the observers on occasions of good seeing as fainter than the Lunae Lacus. The canal Uranius, running between the Lunae Lacus and the Ascraeus Lacus, was seen by several observers usually as a fairly wide marking. Cragg on one of his drawings shows it as narrow. Avigliano on a drawing of June 8 shows it double, the two components running from opposite sides of the Lunae Lacus to points on similar sides of the Ascraeus Lacus. On June 11 Avigliano shows the N. component of the Uranius and the rest of the canal as a shading only.

Certain information received from Tsuneo Saheki, director of the Mars Committee of the Oriental Astronomical Association, prompts us to ask observers with good drawings of the Solis Lacus region of Mars to send them in as soon as possible if they have not already done so, especially if anything unusual has been noted **or suspected** about the Solis Lacus itself.

Figure 3. Mars
June 8, 1954 7^h 40^m U.T.
12½-inch refl. 225X-450X.
C.M.=82° Dia.=19".5
T. R. Cave, Jr.

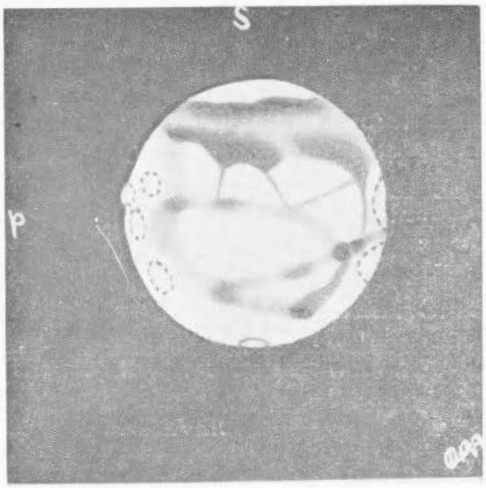

Figure 4. Mars
June 3, 1954. 10^h 10^m U.T.
24-inch refr. used at 12 inches of aperture
210X with yellow filter, 310X, and 540X.
C.M.=164° Dia.=19".0
D. P. Avigliano

Among the canals that connect to the Solis Lacus the most prominent have been Nectar, Ambrosia, and Tithonius.

The colors of the Maria in this area have usually been greenish-grey, the deserts being orange to yellow. Brighter regions have been noted, especially in the region of Candor; a whitish area here, immediately E. of the Ganges, was seen on April 2, 3, and 4 by Capen (Fig. 2). On June 11 the region of Candor was seen by Avigliano as a noticeably brighter light yellow tint.

GENERAL C.M. 160°. Figure 4 is a drawing by Avigliano of the planet at C.M. 164°. On it are shown a number of the canals and oases that lie in this difficult region of Mars. On the E., just coming into view with the planet's rotation, is seen the foreshortened and dark Trivium Charontis—Cerberus I combination; and extending in a general N.W. direction from the Trivium can be seen the fairly prominent Hades I going to the Propontis area. The canal Erebus is seen to have three darker condensations in it (the appearance either caused by actual differences in intensity in the canal or, and more probably, caused by areas of cloud or haze over the canal). The central and darkest condensation might possibly be the Hypelaeus. Note on Fig. 4 that the canals immediately connecting with the S. Maria were all seen as quite narrow while the rest of the canal and oases detail in this area was somewhat diffuse and very faint .The region of the Ulysses canal especially showed very diffuse detail indicative of possible obscuration. The lighter area, Atlantis, in the S. Maria and the small N. polar cap (probably drawn too large due to irradiation) were also seen.

The four clouds shown on and near the terminator were very distinct, the three to the S. being bright white and the one to their N. being a duller white. At 8:15 U.T. the area next to the terminator appeared as one large cloud area; at 10:10 (Fig. 4) it was resolved into the four oval clouds; at 11:30 the N. and S. of these clouds were on the terminator, the other two having already disappeared; at 11:40 the S. of the last two

clouds disappeared leaving only the N. cloud still on the terminator when the observation was ended. Before disappearing each cloud appeared to project. On the sunrise limb of the planet are shown two whitish areas. The S. Maria were seen to be greyish green at this observation. More would have probably been seen at this observation had yellow, amber, or even red filters been available for the higher powered eyepieces. This Recorder finds filters indispensable for doing the best work on Mars, especially so for areas of vague contrasts. Around 11:00 the area between the Trivium and the Mare Cimmerium was seen resolved, in three brief intervals, into a mass of complicated linear-like detail, curved, straight and wisp-like, all very minute appearing. Had the perfect intervals continued a drawing of this detail would have been attempted.

Most of the observers generally show this area of the planet as devoid of detail other than the S. Maria and polar cap. Some of the observers show the canal areas as irregularly shaded while a few show some of the canal and/or oases detail in this area (Cragg, Cave, Westfall, Hake, and Avigliano).

GENERAL C.M. 220°.....Figure 5, drawn by Thomas A. Cragg, depicts the planet with its C.M. at 223°. In this drawing are several most interesting items. Note that the Styx canal is shown double. Cragg also saw it double on the preceding night (May 24). The double appearance of Styx that Cragg shows reminds this Recorder, in part, of a drawing made in 1948 by A. F. Alexander (a British observer). Cragg found the lighter areas, Atlantis and Hesperia, the easiest to see of the lighter areas in the S. Maria. He also found, as did all of our other observers, the Trivium Charontis—Cerberus I combination very dark and prominent.

The region lying W. of the Thoth presented a rather complicated appearance to Cragg as the drawing shows. This somewhat changeable region is one of the most interesting at the current apparition. As at other recent apparitions of Mars, this area continues to show unusual appearances. On this drawing by Cragg one will note three darker centers arranged in a general S. to N. line on a shaded background. Two of these centers might be interpreted as views of the Nubis Lacus and the Nodus Alcyonius. Extending from this area is much detail including several canals. One of the canals extends from the middle one of the dark centers to the E. end of the Cerberus I; near the center of this extending canal is a small oasis.

Of the few drawings by other observers of this area at these earlier dates Cave shows on May 20 what might be interpreted as the general S. to N. area with a darker spot at its S. end and curving and blending into the Casius area on its N. The canals Adamas and probably the one that Cragg shows going from the center dark spot to the end of the Cerberus I are shown by Cave, but Cave shows this latter canal going from his single dark spot to what appears to be the N.E. end of the Eunostos I. Near the center of this canal Cave also shows a small spot. From this spot Cave shows a band of shading extending to the N. and located about half way between the E. boundary of Elysium and the W. boundary of the Thoth-Casius area. Avigliano's best early view of this area was had on May 28. In this view he shows the Nepenthes-Thoth running into a darker condensation while to the N. of this is another dark condensation. To the W. of the condenations is shown a shaded area extending to nearly the boundary of Elysium, darkest near the condensations. The two condensations may be said to occupy positions corresponding to those of the Nubis Lacus (the one to the S.) and the Nodus Alcyonius (the one to the N.). The canals Adamas and Eunostos I and II are also shown on this drawing. Our other observers usually show this Thoth-Casius area as large and shaded, some of them

with instruments as small as 4 inches in aperture.

Among the canals seen in this general area the following were most often noted: Adamas, Styx, Cerberus, and Hades, some of these being shown by Westfall with only 4 inches of aperture.

In color the regions on this part of the planet have been reported as the usual grey, greenish grey, and orange to yellow.

GENERAL C.M. 280°. The last side of the planet we will present at this time is shown on Figure 6. This drawing by Charles F. Capen, Jr. (C.M. 302°) was made under comparatively poor conditions; but as it is one of the best so far received of this area at these earlier dates, we are including it in our set of six views of the planet. One of the most important features of this drawing is the prominence of one of the dark region canals, the Dosaron, shown extending from the dark Syrtis Major area diagonally in a S.E. direction to near the border of the S. polar cap. Mayes, observing two days later, also shows a similar dark band of the same intensity as the dark N. tip of the Syrtis Major extending S.E. in the same position as that shown by Capen. Hake on an early drawing of April 10 (disc 10″.5) shows a darker band in a similar position to that on the above drawings. On a drawing of May 17, in somewhat poor seeing, Avigliano shows a hazy band in the same position.

Note on Fig. 6 what is apparently the Pandorae Fretum. This marking must have been very faint or obscured most of the time, for it is not shown on any of the other drawings that were made at the same presentation of this area.

Avigliano, on a drawing made under rather good conditions on May 20 (C.M. 275°), clearly shows the lighter indentations, Crocea (in the S.W. portion of the Syrtis Major), the Hammonis Cornu (between the Deltoton Sinus and the W. end of the Sabaeus Sinus), and the lighter zone, Cenotria.

On Fig. 6 we should also note the S. polar cap here seen large and with definite outline, the area apparently free of clouds. The N. cap was seen as small. Two white areas were noted by Capen, one preceding the Syrtis Major covering

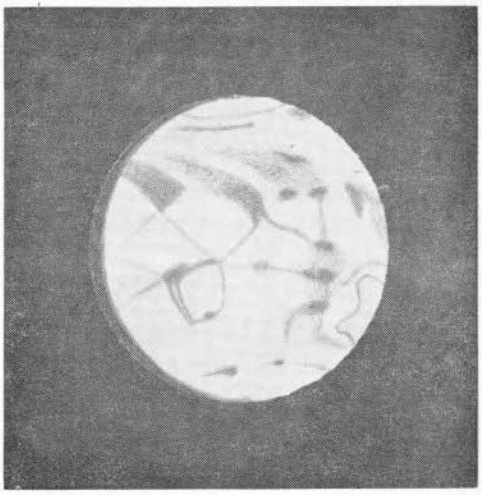

Figure 5. Mars
May 25, 1954. 8^h 40^m U.T.
6-inch refr. 280X.
C.M.=223° Dia=17″.5
T. A. Cragg

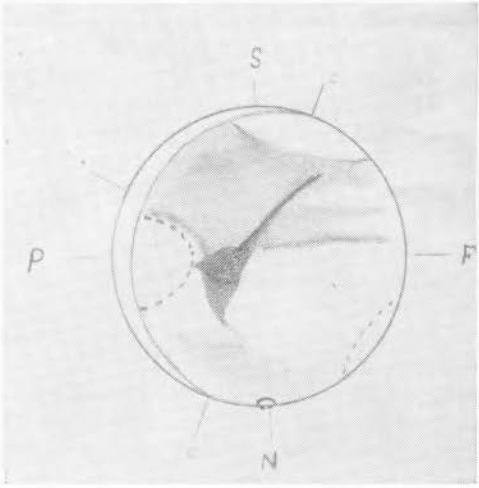

Figure 6. Mars
May 20, 1954. 11^h 00^m U.T.
9-inch refl., 240X and 12-inch refl., 300X.
Amber filters used
C.M.=302° Dia.=16″.5
C. F. Capen, Jr.

the Libya area and the other rising into the morning sunlight on the limb of the planet.

Of the canals in this area the Nepenthes-Thoth and Nilosyrtis were the most prominent at these early dates. The Wedge of Casius, which has been so prominent in recent apparitions, is still very prominent, observers with telescopes as small as 4 inches in aperture showing this area.

Of much interest is a recent communication from Saheki. It reads in part as follows: " . . . Moeris Lacus has usually appeared a large oval shape before last apparition but this year this famous lake is utterly invisible and so the appearance of this region is very strange."

In checking the early presentation drawings so far received of this area the Nepenthes-Thoth is shown as extending from the W. border of the Syrtis Major without any definite modifying detail in the Moeris Lacus region. In connection with the above it might be of interest to look at p. 74 of the May, 1952 issue of **The Strolling Astronomer** where reference is made to a disappearance of the Moeris Lacus at the 1952 apparition of Mars.

The N. portion of the Syrtis Major was recorded by all observers as very dark. In color it appeared to Cave as a dark blue-green. To Avigliano it was a very dark grey-green with at times a definite bluish purple tinge. Other reports of colors seen in this general area include only the usually reported greyish green in the Maria and orange-yellow in the deserts.

Part II of this first report (to follow later) will contain more specific information on the behavior of the polar caps and details of the cloud areas, canals and oases, etc. observed during this earlier period.

THE STORY OF A SHADOW

BY CARL P. RICHARDS

Total Solar Eclipse, June 30, 1954

The narrow strip of the earth's surface along which the total phase of the solar eclipse of June 30, 1954 could be seen was approximately 8,400 miles long and was traversed by the moon's shadow in two and three-quarter hours. It started at sunrise in Nebraska, passed over the cities of Minneapolis and St. Paul, crossed Lake Superior, touched the tip of James Bay and left the continent of North America at the northern coast of Labrador. From there it headed across the North Atlantic Ocean, crossing the southern tip of Greenland, then reached its northernmost latitude, 63°-36′, about forty miles off the southern coast of Iceland and, curving toward the south, crossed the small Faeroe Islands on its way to Norway and Sweden and, following a southeasterly course, passed over Southwest Russia and the Caspian Sea and left the earth at sunset as it entered Northwest India.

The shadow path varied in width from 70 miles near its beginning to nearly 100 miles as it passed Iceland, becoming narrower again as it continued eastward. The speed of the movement of the shadow as it progressed across our globe varied from about 40,000 miles per hour at its start, to only 1,660 miles per hour near the half-way point about longitude 20° west, speeding up again as it went through the second half of its journey. Its average speed works out to about 3,060 miles per hour.

Only about a quarter of the distance swept by the moon's shadow was over ocean. The remaining 6,000 miles was over land, of which some 5,000 miles was across well populated areas, giving, literally, many millions of people the opportunity to see "Nature's most magnificent spectacle". However, that opportunity was subject to the whims of weather and it is of interest to make a brief survey of the fortunes in that respect of the various observers situated along the many miles from which there was some possibility that the total phase of the eclipse might be seen.

For the first few hundred miles of its

path across the earth the shadow of the moon passed through a cloudless atmosphere, enabling hundreds of thousands of people in the states of Minnesota and Wisconsin to have a clear view of a total eclipse of the sun under ideal conditions. Many localities in this area were selected by groups, some coming from distant points of the continent and they were fortunate indeed in their choice of a place from which they were able to see the eclipse so well. Photographs by amateurs and professionals were obtained by the thousand, many of outstanding value, each catching some particular phase of the eclipse, so that a complete record of all its aspects is available. Of course, the great majrity of persons who saw the eclipse came just to "look, see", but even they would carry away a happy impression of the event.

Further northeast along the path, in the Lake Superior area, observers were much troubled by fog, which in places was so thick that nothing was seen, while others just caught a fleeting glimpse of the total phase and a few views of the partial ones. Beyond Lake Superior, across Ontario, cloudy skies prevailed and several elaborate and well-equipped observing expeditions were prevented from obtaining the information they sought. There were also a few parties located along the shadow path across the very sparsely populated area of northern Quebec and their reports were uniformly of cloud or fog.

The United States Airforce had made extensive arrangements for very accurate timing of the movement of the shadow of the eclipse at ten points from Canada to Sweden and on to Iran, for the purpose of ascertaining an accurate measurement of the distance across the Atlantic from North America to Europe. The method they adopted is based on the timing of the second and third contacts the speed of which is governed by the motion of the moon in its orbit, combined with the motion of the rotation of the earth. The laws concerning these are well established, so that the speed of the moon's shadow as it moves across the earth can be determined with great accuracy. Hence, knowing the speed, if the time of its passing each point is found, the exact distance can be figured, affording a valuable check of previous determinations of trans-oceanic measurements.

Ten points were selected and expert observers stationed at each. The first was at James Bay, others being on the coast of Labrador and on the southern tip of Greenland west of the Atlantic, then on the Faeroe Islands and in Sweden, east of the ocean. The tenth station was in Iran. Most of the stations reported cloudy conditions, but in some cases methods using radio gained the needed information in spite of the weather, so sufficient particulars were obtained to secure partial results, but not equal to what might have been the case had fine weather prevailed throughout.

Several interesting communications were received at the A.L.P.O. headquarters telling the eclipse experiences of members, both on the European as well as on the American side of the Atlantic. A group assembled near Mellen, Wisconsin reported that "when totality appeared the sight was nothing less than magnificent. Possibly because of sun spot minimum, the equatorial streamers extended several million miles on both sides and, for 78 seconds, we saw perfectly what we went to see. We hope we took some movies, some kodachromes, some timing and secured other data which is yet to be worked on. It was the finest total eclipse of the five I have been permitted to see and I feel grateful for the privilege." Reference 1.

An observer near Sarona, Wisconsin, where he had a "wonderful view", lamented the brevity of it and stated that "the most apropos comment was made by a physicist from Ohio State who said 'God was in an awful hurry'.". Reference 2.

Another story told of experiences on the Keweenaw Peninsula on the south

shore of Lake Superior, where they were plagued by fog. It clouded over about 11:30 p. m. and some lightning appeared in the distance, but the storm seemed to be passing to the north over the Lake. It rained for about an hour, but about 3 a. m. the sky began to clear and a few clear patches appeared overhead. Soon after the eclipse started the sun went behind dense clouds, clearing again a little later, only to be obscured again by a bank of fog coming in from the Lake. "About five minutes before second contact the fog cleared enough so the crescent could be seen nicely without filters; shortly before totality it cleared more and, for perhaps two or three seconds, shadow bands could be seen on the fog. They were flickering and I got the impression that they were moving in an easterly direction and slightly downward toward the horizon.

"Baily's beads and the diamond ring were seen, then the corona extending quite far to each side. Three or four prominences were visible through binoculars. It had become quite clear by this time, although there was still some very thin fog. I tried taking some pictures during totality, but had to hold the camera to the taillight of my car to see what I was doing, as it was so dark. Due to the fog around us there was little or no light coming in from the sides. Totality seemed just a very few seconds, instead of the 82.5 predicted. After totality the sun came out very brightly for a few minutes, then clouded over again." Reference 3.

That seems to be a typical experience for parties near Lake Superior. North of the Lake in Ontario and further northeast the persistent cloudiness of the sky prevented any satisfactory observations of the eclipse. However, over in Europe, some expeditions to the zone of totality were quite successful. A letter from near London brought word of a joint expedition of the Royal Astronomical Society and the British Astronomical Association which sailed from England a week before the eclipse and landed at Goteborg in West Sweden and went on to Lysekil, making their headquarters in the hotel there. About 150 persons were in the party, bringing with them much equipment, such as telescopes, spectroscopes, cameras and other instruments. On June 28 a combined meeting was held for the purpose of discussing plans and arrangements, over which the president of the B.A.A. presided. Then the account proceeds as follows:—

"June 30 was grey at dawn and we abandoned hope. However, we carried on and went up the coast to Strömstad, our selected site (on the center line of the shadow path), praying to all the numerous Swedish gods. They were kind. Blue sky appeared and by first contact there was little cloud left. The hill overlooking Strömstad was soon bristling with equipment of all types and the local populace, after an initial feeling that we were mad, made themselves both agreeable and useful. What pleasant folks the Swedes and Norwegians are. I was trying to trap and photograph the shadow bands, but no one saw any; the thin cirrus must have prevented their making an appearance.

"The shadow approached; everything became still and, as the moon's body crept over the sun, there was sudden blackness. The corona flashed out, brilliant near the lunar disc and fading away in two 'wings'. With the naked eye I could see six prominences, though I was busy helping with the photographic program. It was over too soon for us; the 'diamond ring' heralded the return of the sun and the corona faded from view. Some gave the corona a violet cast; others described it as almost white. What is certain is that the 'diamond ring' was preceded by a glorious ruby flash, which alone was worth coming to see. Totality over, we started to dismantle our equipment; in an hour, Strömstad Hill was deserted and, incidentally, the clouds were rolling up. We were indeed lucky." Reference 4.

Another interesting letter came from

Copenhagen, telling of the trip some fifty individuals of the Danish club "Urania" made into the totality zone in Sweden. The place to which they went was Svartö, on the mid-line of the eclipse path, and about 43 miles north of Kalmar on the east coast, where, the letter records, "after 25 years of meteorological observations there should be 70 per cent chance for a clear sky". Hence, continuing to quote, "It was with excitement that we were going to the place in the morning 30-6-1954. After a clear night the sky became overclouded. There was no hope any more! The meteorological report was pessimistic too." First contact came at 11^h, 34^m U.T., but could not be seen and, though there were a few fairly clear intervals, the last one when 99 per cent was eclipsed, the total phase was completely clouded out. "When the darkness came" the latter says, "I thought of Longfellow's poem:—

'The day is done, and the darkness
Falls from the wings of Night'.

"It was still possible to read usual printed letters, but at a distance of 10 meters it was impossible to distinguish facial expression. In the N.W. and in Zenith the sky was black, blue and violet. The scenery was reddish and violet. In S.E. the sky was wonderful lemon-coloured. It was easy to see the shadow move over the sea. 4 contact was at 13^h 59^m U. T. Under the eclipse I measured the temperature. By the beginning it was 19°.3 C warm. Under the totality 12°.0 C. After the eclipse 14°.8 C. The curve of the temperature was very irregular on account of the clouds. Under the totality it was calm, after a strong wind was rising." Reference 5.

Svartö, the scene of the foregoing account, is on the Swedish mainland opposite the island of Oland, 20 miles away at this point, on which the elaborately equipped expedition from the Meudon Observatory in France was stationed. Reports from there indicate that the eclipse was not so badly clouded out as it was at Svartö, though conditions were far from ideal.

A very informative communication received from Europe was a letter from the director of the Society of Friends of the Stars, Berlin, Germany. With it came a copy of the August 1954 "News Bulletin" issued by that Society. The first of several interesting articles in it is a report on the Eclipse Expedition of German amateur astronomers. It is printed in the German language, but contains so much of interest that we give herewith a free translation of practically the whole article. Reference 6.

"The Eclipse Expedition of 1954 was very fortunate in their location on the island of Galtö, near the west coast of Sweden, as the atmospheric conditions were nearly perfect at this place. It seems too, that we were specially fortunate because we were the only German group that was able to view the eclipse under such ideal conditions. In areas where other parties were located the weather was generally unfavorable at the time of the eclipse. There were about 50 different expeditions from many lands concentrated in Sweden, of which number only about 10 could have possibly observed the eclipse and, of these 10 groups, at least half of them were hindered in their observations by partial overcasts and clouds.

"Only on the island of Gotland, off the east coast of Sweden, was there a perfectly clear sky. On the island of Galtö, where we were, the clouds parted a few minutes before the start of the eclipse and, during totality, the sky was perfectly clear. Some of the groups stationed on the mainland were rained out, but the tests and observations carried out by planes were, of course, not hampered by atmospheric conditions.

"Of special interest in this year's eclipse was the extra long shape of the corona, such as had never before been observed; photographs we obtained clearly show this phenomenon. The expedition's program was rather elaborate and, therefore, expensive. 36 people participated, mostly

members of this Society. There were 15 instruments of various kinds, some of them doing double duty.

"Besides 40 synchronized exposures of the partial phases, which were intended for later stereo-slides, we secured 50 exposures of the total phase. These included monochromatic shots within the range of small spectrum regions. Also a number of color negatives and positives, in addition to 3 reels in color of the whole spectacle of the eclipse and one reel of the phase of totality. This latter, unfortunately, was on only 9.5 mm. wide film.

"The data collected are not yet completely evaluated, as considerably more work has to be done to clarify certain points by drawings. However, it is reasonably sure that seventy-five per cent of the photographs we obtained will assure the success of the enterprise. Fuller reports will appear shortly.

"We are deeply grateful to the Swedish authorities and the Swedish population at the locations mentioned for their generous and whole-hearted cooperation and assistance."

Accompanying the above described article in the "News Bulletin" was a copy of one of the photographs taken which shows the special features of the corona which are mentioned. The photo is such an unusually fine one that we take pleasure in reproducing it near the front of this issue. All who witnesed this superb event were impressed by its exceptional beauty, and we hope this picture will convey to our readers some measure of the inspiration experienced by those who were privileged to actually see that masterpiece of Nature—a total eclipse of the sun.

This 'story of a shadow' would not be complete without a reference to another aspect of it. In news items concerning this eclipse coming from distant lands, was one that was depressing, rather than inspiring. In India, where the eclipse occurred late in the day, it was the occasion of one of those mass demonstrations which, so often, are the accompanyment of orgies of religious mania, fostered by ignorance. Hundreds of thousands of natives assembled at a "holy" lake to immerse themselves in it as a sort of sacrificial rite. They believe the sun and moon to be beneficial gods and, during an eclipse, think that some revengeful demon is devouring the sun, which they seek to prevent by ritualistic acts of penance.

Contemplation of such a scene reminds us that the age of enlightenment, exemplified by our knowledge of the workings of the Creator's Universe, is still only partial and that much work is yet needed in the realm of education in order to spread the truth, thus helping to eradicate the widespread ignorance that breeds superstition and distress.

Postcript by Editor. We express our thanks for this article to Mr. Carl Richards, 530 N. 19th St., Salem, Oregon. He himself was one of the witnesses of the magnificent spectacle of the total solar eclipse on June 30 ,1954. Our contributor is one of our A.L.P.O. charter members and has been a national officer of the Astronomical League.

REFERENCES

PLACE OF OBSERVATION	CORRESPONDENT	ADDRESS
No. 1. Mellen, Wisconsin	Donaldson Craig	Detroit Astronomical Society, 4835 Second Blvd., Detroit 1, Michigan
No. 2. Sarona, Wisconsin	Oscar Monnig	P. O. Box 2200, Fort Worth 1, Texas
No. 3. Keweenaw, Mich.	Lyle T. Johnson	Box 187, La Plata, Maryland
No. 4. Strömstad, Sweden	Patrick Moore	Glencathara, Worsted Lane, East Grinstead, Sussex, England
No. 5. Svartö, Sweden	Gösta Persson	Bytoften 2 St., Copcnhagen, Valby, Denmark
No. 6. Galtö Is., Sweden	E. Madlow, Director, Society of Friends of the Stars	Wilhelm Foerster Observatory, Berlin-Schoeneberg, General Pape Strasse 2, Germany

HERODOTUS

A LIGHT THAT FAILED

BY JAMES C. BARTLETT, JR.

The entire Aristarchus-Herodotus region is one of the very greatest interest, and one might spend years there without exhausting its details. Herodotus itself, however, has long been considered to be of little interest, apart from the great valley which apparently originates within its confines. Webb does not even mention the crater. Nasmyth and Carpenter merely observe that, "There are no features about Herodotus of any such specialty as to call for remark . . . "[1] Goodacre found the floor virtually featureless, though his map shows some light streaks. Wilkins shows little more — a ruined ring or shallow depression in the extreme north; a couple of hillocks and a little craterlet in the same place; two light streaks in the south; a small bright area in the S. W. . . .[2] Altogether a dull object indeed when compared to its brilliant and enigmatic neighbor on the west.

Yet it may be that a more critical investigation of this crater might result in a very different picture. As by way of example we might consider the following:

On the night of June 27, 1950 (all dates and times by U. T. here and hereafter), T-3, S-4, I was engaged in a minute examination of Aristarchus with my little 3.5 in. Newtonian at 100x. As customary, I drew Herodotus also; but paid so little attention to the latter that no mention is made of it in the notes. The time was $2^h\ 30^m$ and the colongitude was 53.°2. Owing to the circumstance that I made no written comment on Herodotus, the following facts must be obtained entirely from the drawing. In a way this is really fortunate, in that it demonstrates beyond doubt my lack of interest in the crater on that evening; this insuring that what I drew was merely recorded mechanically without any previous ideas to affect judgement. The drawing itself is clear and precise (Fig. 7), and having in mind certain techniques I employ in making lunar sketches I am able to derive the essential facts very easily. The east inner wall of Herodotus was in sunlight, and around this colongitude it is quite bright being perhaps 7°

to 8°. The bowl of the crater was still filled with black shadow and the conspicuous central peak was fully as bright as the inner east wall. On a very fine night, July 27, 1950, T-5, S-7, using the same telescope and power, at 3^h 56^m, col. 60°.56, I found this central peak much less conspicuous. Of course there is nothing particularly unusual in such a phenomenon, and variations in the intensities of other central peaks, e. g. those of Theophilus, have been suspected. Perhaps the only novel feature in this case lies in the fact that **Herodotus does not have a central peak.**

Right at this point—before matters get any more complicated—the reader should understand certain facts very clearly; as they not only have an important bearing upon the credibility of these observations but also illustrate the disastrous ease with which lunar phenomena may pass completely unnoticed, even by experienced lunar observers. A mere glance at the wild chaos of the lunar uplands should convince any reasonable person that it is humanly impossible to be thoroughly familiar with every aspect of every lunar feature; yet such knowledge is requisite to any serious judgement on the subject of lunar surface changes. Hence the best we can hope to do is to concentrate on some few selected objects and to become thoroughly familiar with **them.** We are then in position, with respect to our particular specialities,, to judge whether they are always the same or not. I have ranged over the moon for more years than it would be polite to inquire; but it chanced that Herodotus was not one of my interests. Of course I knew that Herodotus had no central peak; but I knew it as something read and forgotten, not as something important to remember. Hence when I first beheld that bright pseudo-peak it seemed so completely natural that I automatically drew it without further thought. And hence the reader may be assured that these observations are completely objective **because** ignorant.

Indeed the original observation made

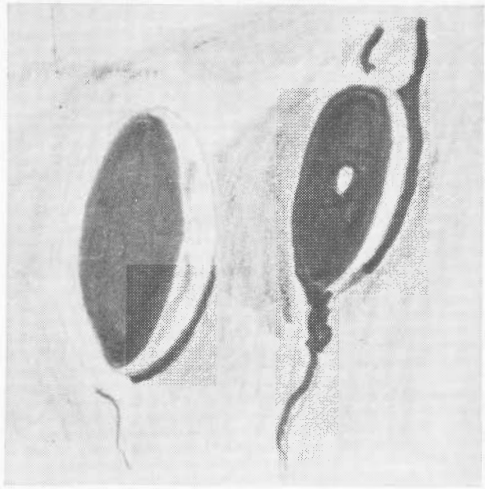

Figure 7. Aristarchus-Herodotus
June 27, 1950
2^h 30^m U.T. Col. 53°.2
3.5-inch reflector at 100X
T-3 S-4
James C. Bartlett, Jr.

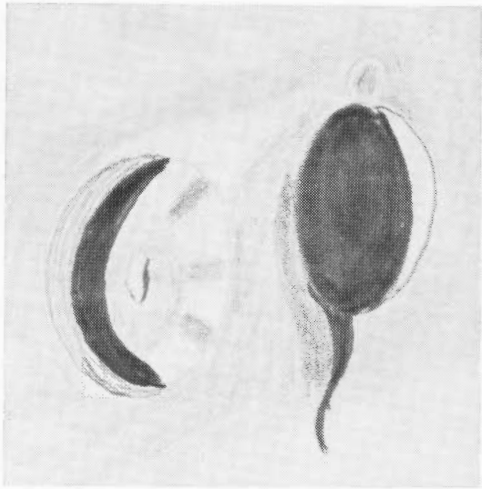

Figure 8. Aristarchus-Herodotus
July 13, 1954
1^h 43^m U.T. Col. 59°.0
5-inch reflector at 150X
T-2 S-4 to S-2
James C. Bartlett, Jr.

so little impression upon me (concerned as I was with Aristarchus), that when I drew Herodotus on August 8, 1950, at col. 208°.8, and again on August 9, 1950, at col. 221°.0, and saw the sunlit floor sans any central peak or even central white spot, I registered that fact with equal ignorance and objectivity.

It was not until nearly four years later that the truth suddenly dawned upon me, and then only by one of those happy accidents through which knowledge is so frequently augmented. In the summer of 1954 I began a minute survey of the entire Aristarchus-Herodotus region, in preparation for a future paper calling attention to certain marked peculiarities of that interesting area. Accordingly, Herodotus was to feature prominently in the new investigation. On July 13, 1954, at 1^h 43^m, col. 59°.0, with a new 5-inch reflector at 150x on an unfavorable night (T-2, S-4 to S-2), a drawing was secured (Fig. 8) which though deficient in fine detail because of the poor seeing was good enough to record among other things three of the dusky wall bands of Aristarchus. The east wall of Herodotus was quite bright, and I estimated it to be at least 8°. The floor of Herodotus, as may be seen in the drawing, was still in full shadow and it is evident that there is no central bright spot of any kind. After finishing this drawing I sensed that there was something "wrong" in the appearance of Herodotus; when it suddenly occurred to me that at a similar colongitude in 1950 I had seen a bright central "peak" in the crater! A hasty research through the record book soon turned up the observation of June 27, 1950, with which this chronicle began; and it was then that I remembered what I should have remembered four years earlier, namely, that Herodotus has no central peak. Ergo, what I had seen on June 27, 1950, and again on July 27, 1950, had been something decidedly abnormal—or, as some might say, "impossible".

Why I should have recalled that particular 1950 observation I do not know; for on backtracking through the record book I found a still earlier observation of November 3, 1949, at 1^h 06^m, col. 57°.37, 3.5 in. reflector at 100x, in which an apparent central peak was also recorded. On that occasion I had noticed Herodotus sufficiently to make a brief note to the effect that the floor was very dark and the rim very bright. Nothing was said of the apparent bright peak; but, as in the June observation of 1950, it is clearly drawn. Following the 1949 observation there came a long series devoted almost exclusively to Grimaldi, and the next figure of Herodotus is the one of June 27, 1950. On July 2, 1950, at 7^h 15^m, col. 116.°56, Herodotus is again depicted with the note that the floor "is extraordinarily dark and appeared sensibly black". There is no central bright spot, the absence of which I blithely recorded in the drawing without noticing anything strange in this circumstance. The next observation in order is that of July 27, 1950, in which an apparent central peak is again shown. On July 29, 1950, at col. 85°.83, the floor of Herodotus is depicted as being very dark; and, as in the observation of July 2, there is no central bright spot, the absence of which again failed to impress me. On July 30, 1950, the appearance is the same and I merely noted that "the floor of Herodotus continues to be extremely dark". There then followed five more observations of Aristarchus, in which Herodotus figured incidentally, as follows: August 6, 1950 at 6^h 21^m, col. 183°.76; August 7, 1950 at 5^h 56^m, col. 195°.77; August 8, 1950 at 7^h 35^m, col. 208°.84; August 9, 1950 at 7^h 31^m, col. 221°.04; August 28, 1950 at 4^h 25^m, col. 91°.63. In none of these observations did the pseudo central peak appear, though I find occasional notes on the floor color and intensity of Herodotus indicating that some attention had been paid to the crater. After this, obervations of Aristarchus—and therefore of Herodotus—were discontinued until the present time.

Thus in eleven observations I had seen this central bright spot only three times, a sufficient indication that it is not a constant feature of Herodotus. Why its earlier absence had failed to impress me while four years later it did, I must leave to the psychologists to explain. Perhaps because in the summer of 1954 I had become as much interested in Herodotus as in Aristarchus, whereas in 1949-50 Herodotus was only of incidental interest and beyond mechanically registering what I saw in the crater I gave it no thought.

What makes this case unique is the nature of the spot. It is nothing unusual to find faint white spots here and there which occasionally become invisible. Plato is a good example and Grimaldi is notorious. But the Herodotus spot was not faint, at least not when I saw it on June 27, 1950. It was so bright that I equated it with the bright east wall at sunrise and naturally enough mistook it for a sunlit central peak, or central mountain mass.

It was not a reflection. There can be no question here of reflection from the brilliant east inner wall; for there is certainly no elevation in the center of the floor to catch it. The spot, therefore, must have been **on** the floor; and in order to have become as bright as the sunlit east wall it must have been self-luminous. I see no other explanation. It was not a volcanic eruption. Improbable as such an eruption would be in the first place, it is certain that it would leave discernible traces behind it. The floor is quite unmarked at the site of the spot.

It was not an impact flare. Referring to the observation of November 3, 1949, it is found that 27 minutes were consumed in the observation. During this period it is certain that the pseudo central peak remained steadily visible. Had there been any marked variation in its intensity during such an interval I could scarcely have failed to notice it. Moreover, because of the vacuum-like tenuity of the lunar air, any incandescent body on the moon would lose most of its light almost instantly—unless immensely large. But a mass great enough to remain at incandescent heat for nearly a half-hour would also have profoundly altered the surface at the point of impact. In fact it would probably have destroyed Herodotus altogether!

Was I simply deluded after all? If so, then I was deluded on three separate occasions in the same way. And if deluded, then by **what?**

The question here resolves itself into another one. Has any one else recorded a bright central spot of any kind in Herodotus?

In order to answer this question I had recourse to several of the older authorities dating back to Webb but not earlier. Webb had nothing whatever to say of Herodotus. Neison declared that, "on the floor, though a small ridge lies under the west wall, neither craterlets nor central mountain are visible".[3] Most of his section is devoted rather to the environs of Herodotus than to the crater itself. Elger, like Neison, gives most of his attention to accessory objects such as Schroeter's Valley and merely remarks on "the very dusky floor" of Herodotus.[4] His map, like Neison's, shows the floor devoid of any central spot and indeed of any detail whatever. Nasmyth and Carpenter dismiss Herodotus with very few negative words as we have already learned. Goodacre found the floor featureless. In several modern handbooks Herodotus is not even mentioned! Olcott and Putnam content themselves with two lines, in which the only information given of Herodotus is that it is 24 miles in diameter.[5] Moore, taking four lines, states that, "Herodotus is chiefly notable on account of the celebrated valley which starts from inside it".[6]

From all of which it may be gathered that nothing very exciting has ever been recorded of this crater. There is a unanimity of opinion that, apart from the great valley, Herodotus is thoroughly dull. Thus in the limited researches undertaken there has not been found a sin-

gle observation to sustain the writer's report of a bright central spot in Herodotus.

Excepting one.

On the night of March 30, 1950, Dr. H. P. Wilkins, the eminent British lunar authority, was examining the Aristarchus-Herodotus region with his 15¼-inch reflector. The view was shortly after sunrise, with the floors of both craters still about half in shadow. In the center of the floor of Herodotus, precisely where some three months later in the same year I saw a bright pseudo-peak with the floor **wholly** in shadow, Dr. Wilkins recorded a large, oval bright spot. You will find his drawing reproduced in Moore's recent and excellent book on the moon.[7] In a personal and delightful conversation with Dr. Wilkins, he assured me that any such spot he may have drawn was actually there, a fact that is hardly open to doubt. Although at the moment he did not recall the circumstances of that particular observation, he did remark that the bright spot was a surface marking.

We may now notice a significant fact. In Wilkins' drawing, this central bright spot is **cut off** by the shadow of the west wall. In other words it was then—March of 1950—not sufficiently luminous to be detected within the shadow. In June of the same year it was so bright that I saw it while the floor of Herodotus was **completely in shadow.** There can scarcely be any inference other than that between March and June of 1950 this enigmatic spot greatly increased in intensity, and indeed must have become self-luminous —though not necessarily because of incandescence.

We may now summarize our knowledge of this surprising feature as follows:

1. There is no reference to such a spot to be found in the authorities consulted, who all agree upon the featureless character of the floor of Herodotus.
2. It was first noticed by the writer in November, 1949.
3. It was independently seen by Wil-

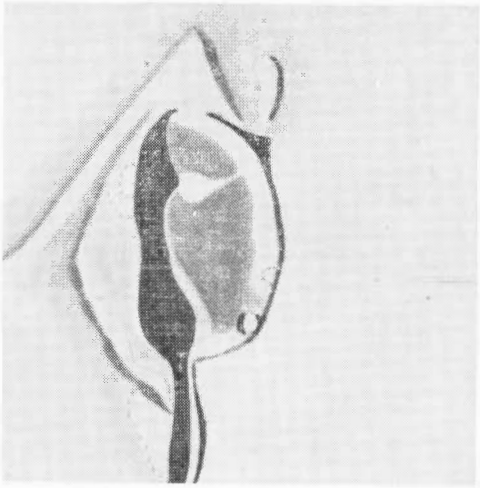

Figure 9. Herodotus
Sept. 10, 1954
2^h 00^m U.T. Col. 59°.9
6-inch reflector at 220X
S-3 to S-4 T-4
E. J. Reese

Figure 10. Herodotus
July 25, 1954
9^h 20^m U.T. Col. 209°.4
6-inch reflector at 240X
S-6 T-4
E. J. Reese

kins in March of 1950.

4. It has not been seen by the writer since July 27, 1950.

5. It is not visible today.

In order to make certain of point 5, having in mind superior seeing conditions and/or equipment at other stations, I solicited the aid of Professor Haas, Mr. Reese, and Mr. Rosebrugh. These observers, all of whom are men of experience and integrity, were asked merely to observe Herodotus at colongitudes which would most nearly reproduce the conditions of March 30 and June 27, 1950; and to record every detail they saw within the crater. Naturally no hint was given as to what they were to look for, and none of them realized that it was the **absence** of something which their researches were to demonstrate.

All three generously responded and all three made detailed drawings and notes, all of which show that there is nothing presently visible on the central floor of Herodotus to account for the strange bright spot observed by Dr. Wilkins and this observer. Two views of Herodotus by Reese, one under morning illumination, the other under evening illumination (Figs. 9 and 10), may be taken as typical of what was generally reported. In addition to the observations of Haas, Rosebrugh, and Reese, I was also able to consult photostatic copies of a number of drawings of Herodotus at various colongitudes made by Mr. Hill, lunarian of the British Astronomical Association; and several sketches by Mr. Frank Suler of Richmond, Texas. This material I had on loan of Professor Haas. A valuable aspect of the Hill pictures is that they cover an earlier period, namely 1946, which was nevertheless near in time to 1949 when I first noticed the Herodotus central bright spot. The Hill pictures are for December, 1946, and run from colongitudes 56° to 205°.5. In none of them is there any evidence of a bright central spot, with the doubtful exception of the one for Dec. 7, 1946, col. 80°, in which an elongated bright spot appears on the floor of Herodotus and appears to run from the W.N.W. wall S.E. across the floor to the center. However, this feature does not occupy the proper position, nor is it oriented properly, to qualify for identity with the central spot of June 27, 1950. In this connection it is of interest to quote from a letter to the writer written by Mr. Reese. When Mr. Reese sent this letter he had just completed his last Herodotus observation and did not know just what it was I had been investigating. Hence the following is of unusual coincidence: "On March 30, 1950 Dr. H. P. Wilkins saw a bright spot in the center of the floor while using a 15¼-inch reflector. I suspect that the spot was either transient or else Wilkins misplaced a bright spot normally visible somewhat to the south". Mr. Reese did not suspect that it was the disappearance of that bright spot which was the cause of his observations!

Reference to the "normally visible" spot refers to a spot which has long been known, and which lies at the southern end of the crater a little S.W. This spot was carefully studied by Mr. Rosebrugh, who may have suspected that I was interested in it, and shows on the drawings of Rosebrugh, Reese, and Haas. I have also seen it many times. In my judgement it is very unlikely that this spot could have been misplaced to the extent implied. Wilkins shows very clearly that his spot of March 30, 1950, was most certainly in the center of the floor and far removed from this S.W. spot. So I saw it also. Moreover, so far as I am aware, this S.W. spot is entirely normal and has never been seen **within the shadow.** The fact that the central spot of June 27, 1950, shone out like a brilliant mountain top while in full shadow points to its very abnormal nature . . . whatever its nature may have been.

In passing it may be remarked that Walter H. Haas, while engaged in observing Herodotus for the writer, quite fortuitously witnessed a most peculiar behavior of the shadow on a certain part

of the floor; which suggests that a little closer attention might be paid to this crater—but that is another story.

Meanwhile if any one can tell me what has become of the brilliant central spot of June 27, 1950, I shall be glad to hear from him. Does anything ever happen on the moon?

Ask of Herodotus!

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BOOK REVIEW

BY WILLIAM E. SHAWCROSS

ESSAYS IN SCIENCE

BY ALBERT EINSTEIN

Philosophical Library, New York, 1934, 114 pp., 6 sketches.....$2.75

Dr. Albert Einstein is one of the world's leading theoretical physicists and a very prolific writer on this subject, as well as many others. ESSAYS IN SCIENCE is an abridged version of his larger volume, THE WORLD AS I SEE IT, and includes all of the papers concerning scientific subjects. Omitted are his writings on such subjects as Pacifism, Judaism, Germany, Politics, and other like topics. The publisher's preface states the object of the book to be the presentation of some of Dr. Einstein's papers dealing with scientific subjects for the general reader. In this the publisher has been eminently successful.

This small book contains papers falling roughly into four categories. The class represented by the first paper, "Principles of Research", concerns itself with the general philosophy of science and the scientist. In the same vein we also have a short paper "On Scientific Truth". Next we find a group of biographical appreciations of great scientists, past and present, and the problems in physics which they faced and solved. Composing this group are "Johannes Kepler" and "Niels Bohr". Newton and Maxwell are also represented, but the papers on these men fall, in the main, into another category. Two of the papers, "The Cause of the Formation of Meanders" and "The Flettner Ship" make up the group of writings in this volume which popularize a branch of physics not directly connected with relativity.

The major portion of the book consists of papers on the theory of relativity; the reasons for the need of such a theory, its history and development, and some of the ideas and implications of the theory. The topics "The Mechanics of Newton" and "Clerk Maxwell's Influence" give the background of developments which led to the special theory, and later the general theory, of relativity. "Address at Columbia University", "On the Theory of Relativity", "Theoretical Physics" and "Inaugural Address" serve to point up the development of the theory. A good explanation of why the special theory preceded the general theory is given in the "Address at Columbia University", a point which may puzzle some readers. Finally, "What Is the Theory of Relativity?", "The Problem of Space", "The General Theory of Relativity" and "Relativity and the Ether" give us a fairly simple idea of the true nature of the theory and of the ground it tries to cover. There is little in the way of mathematics in this book, and what there is can be readily understood. This, com-

bined with Dr. Einstein's typical conciseness and clarity, make this a book from which the reader can gain something more than a sense of confusion!

If any scientist's name is a household word, it is undoubtedly that of Albert Einstein. Few writers in the field of theoretical physics have managed to get across their points as well as the author does here. And even fewer of these writers have formulated the theories which they discuss. Many of you are doubtless familiar with the classic, EVOLUTION OF PHYSICS, co-authored by Einstein and Infeld, which is now in its thirteenth printing—a good indication of the popularity of the man who is now at Princeton's Institute of Advanced Study continuing his great work.

Above all, however, this collection of writings gives a clear insight into the fundamental basis and philosophy of physical science. Physics has been defined as "that branch of human endeavor which has as its goal the complete description of the entire material universe". Dr. Einstein has, perhaps more than any other man since Newton, done the most to extend and generalize that description—to present it in as few terms as possible. Here we have the man who can speak with authority, and who does so in an easily understood manner in this little volume of his most interesting papers.

BOOK REVIEW

BY JAMES C. BARTLETT, JR.

PERCEPTUALISTIC THEORY OF KNOWLEDGE, by Peter Fireman, Ph. D.; Philosophical Library, New York; 1954; 50 pages $2.75

The complete evaluation of this slim little volume belongs to the professional philosophers, who alone will know how to appraise the author's arguments as they are related to technical competence; but for the lay reader it is sufficient to notice that the whole point of this work may be summed up very simply: Because we perceive, we know.

In the **Prologue,** Dr. Fireman states it this way: "For all knowledge begins with accurate perception". We are then introduced to two technical terms which bulk largely in the pages which follow, the **percept** and the **repercept.** The **percept,** we learn, is the product of a perception; while a **repercept** is a perception retained in the memory. Our author suggests that the word **repercept** be substituted for the word **idea.**

The theory that a perception retained by the memory is the same thing as an idea is certainly a novelty, and one may question whether such a definition can be stretched to cover all classes of ideas. Insofar as a simple idea may correspond to a simple memory image, or to a picture constructed of such images, the validity of the reasoning may be granted. But how are we to accommodate it to that process of thinking whereby pure abstractions or idealizations are employed to construct what is commonly understood by "ideas"?

The author's approach to a theory of knowledge will be received differently by those of different philosophical prejudices. The Idealists for instance, may complain of insufficient recognition of the **noumenon** behind the phenomenon; of a tendency to ignore the **Deus ex machina** in constructing a theory of thinking. The Mystics may deny the validity of the major premise, namely, that all knowledge comes first through perception. The Sensationalists may question whether sensible contact with an external object may be compared to awareness of inner modes. Yet Dr. Fireman has something for all, and his book should certainly stimulate to thought if it does nothing else.

Perceptulistic Theory of Knowledge is easy to read in one sense, difficult in another. On the credit side one must mention the clear and restful typography and the subdivision of the book into numerous short sections which make for

easier mental digestion. One may here also commend the author for resisting the temptation, so common to philosophers, of expanding a simple idea into a prodigious tome that is weighty by reason of sheer mass alone.

But having said so much one must also notice a tendency in the author to wander far afield in those sections in which he culls examples from many disciplines to illustrate his theories. The effect is sometimes bewildering, and one is left wondering if he is reading a treatise on knowledge or an elementary introduction to chemistry, physics, mathematics, general science, and so on. One may also wonder if personal bias played any part in the selection of the examples, as in the section on **Analytic Mode of Thinking.**

In this section the concept of **Justice** is treated not as an abstraction, but as a concept largely related to economic relations and reads like a page from **Das Kapital.** I am sure that it would be news to several tycoons of my acquaintance to learn that modern labor is "driven by the compulsion of dire necessity to accept whatever wages they can get". Such prejudices, which ignore the facts of modern economics, may do very well in a political campaign but seem rather inappropriate to an objective philosophical work.

Perceptualistic Theory of Knowledge presents a basically simple idea in simple language, which should be attractive to the reader without technical philosophical learning. Despite some wandering here and there the book hangs together and is provocative of thought, whether one agrees with the author's premise or not.

OBSERVATIONS AND COMMENTS

Colored Lunar Area Near Cleostratus. Mr. Alika K. Herring writes that on May 16, 1954 from $4^h\ 0^m$ to $4^h\ 45^m$, U. T., colongitude 71°.4 to 71°.8, he observed in his 8-inch reflector a distinct bluish black coloration on the terminator east of Pythagoras. As nearly as he could determine, the coloration was either in the area between Cleostratus and the adjoining crater to its north or on the north wall of Cleostratus, which lies on Section XVI of the Wilkins map. Suspecting that the color might be in his eyepiece, Mr. Herring looked for a similar effect in adjacent craters but found nothing. For the same reason it cannot be due to atmospheric dispersion. He states: "The color was very distinctly bluish black, with a sheen resembling gun metal and was limited very sharply to this one particular area . . . Nothing else along the entire terminator showed any similar coloration." To our knowledge no such color has previously been observed at this lunar position, and we invite A.L.P.O. lunarians to watch for its possible reappearance in the future.

Kepler. This crater was observed by R. M. Adams with a 4.3-inch refractor on May 14, 1954 at colongitude 59°.1 and by F. J. Kelly with a 4-inch refractor on November 17, 1953 at 49°.3. Adams drew a large low mound near the foot of the northwest inner wall, which mound is probably shown by Kelly in a somewhat different position. Kelly further drew a curved line of shadow running south from the small central peak. It must be the shadow of a ridge, a fault, or a cleft but is absent from maps and should hence be looked for.

Apparent Lunar Natural Bridges or Arches Near Aristotle, Burg, and Torricelli. On pg. 45 of our March-April, 1954 issue we spoke of observations by A. C. Larrieu and R. L. Jernigan, Jr. of a possible natural lunar bridge or tunnel on the west wall of Aristotle. Their work was the more interesting because of current keen interest in the O'Neill Bridge on the east shore of the Mare Crisium. However, Mr. Larrieu could see nothing of the sort in Aristotle on May 8, 1954; and Mr. Jernigan satisfied himself in

the same month that he had been misled by a large protuberance near the foot of the west inner wall. Certainly this experience emphasizes that one must be **very careful** in interpreting lunar topography. It is **very important** to examine an object under different solar lightings and with different librations as well if it is near the limb. This caution must apply, we fear, to an apparent bridge near the lunar crater Burg observed and drawn by Mr. Jernigan on June 7, 1954 at 340°.0 with a 6-inch reflector at 360X. This "bridge" is drawn to be in line with the long cleft running east-southeast from the east wall of Burg and perhaps two diameters of Burg away from the east wall. Mr. Jernigan draws it to lie across a wide valley between two branches of a small mountain range. Finally, this same observer on July 6, 1954 at 334°.3 drew the outer shadow east of Torricelli to be split into two separated long fingers. We may have a better case for a bridge or arch here because Molesworth many years ago observed a bright line in the outer shadow of Torricelli and imputed it to a fissure in the wall (pg. 83 of Goodacre's **Moon**). Mr. Jernigan also calls attention to a curious-shaped lunar formation several diameters southeast of Torricelli.

Theophilus. We have received drawings of this imposing crater from L. B. Abbey, Jr. of Decatur, Georgia on June 7 and 8, 1954 at 338°.2 and 351°.1 respectively with a 6-inch reflector and from R. L. Jernigan, Jr. of San Antonio, Texas on June 7, 1954 at 339°.4 with a 6-inch reflector. The central mountains show a complicated structure and were compared by Mr. Jernigan to "balloons on a stick." Many years ago W. H. Pickering carried out a study of these peaks and reported it in "The Snow Peaks of Theophilus," **Popular Astronomy,** Volume 25, pg. 149, 1917. On June 8 Mr. Abbey observed several rows of craters on the west inner wall. These crater-rows can be found in many different places on the moon and would appear to be most difficult to explain on the meteoritic impact theory of the origin of the lunar surface formations.

Atlas. This ring-plain has long been a favorite of active lunarians. We have on hand a drawing by Mr. J. E. Westfall on January 9, 1954 at 323°.4 with a 4-inch refractor and one by Mr. P. W. Budine with a 3.5-inch reflector on April 21, 1954 at 126°.9. Thus Mr. Westfall observed very soon after sunrise; Mr. Budine, soon before sunset. Several bands of shadow on Mr. Westfall's drawing may coincide in position with known clefts on the floor—if so, very creditable performance for a 4-inch telescope. Mr. Budine's drawing shows, among other features, two small craters, of which the eastern is much the smaller, near the foot of the south inner wall; these must lie in the conspicuous dark area in the southern part of the floor under higher lighting. Budine observed the west outer wall of Atlas to be wide, brilliant, and terraced.

Plato. In this discussion we shall adopt the nomenclature of E. J. Reese's chart on pg. 5 of our January, 1952 issue. W. F. Barber, Jr. of Atlanta, Georgia has reported some curious observations of Plato with 6-inch and 3.5-inch reflectors. He saw a white spot near the foot of the southeast inner wall from $3^h\ 15^m$ to $3^h\ 35^m$ on August 11, 1954 at colongitude 54°.3, the spot being visible both with and without an amber filter. A drawing shows the spot to lie a little south of Spot C. Perhaps it actually is C, for the observation was made with only 35X; but if so, it is surprising that no other spots were seen on the floor since C is usually less conspicuous than Spot A. Mr. Barber observed the spot again on August 12 near colongitude 66° and on August 13 near 78°. It will be interesting to hear whether other A.L.P.O. members observed Plato on any of these dates and whether they saw anything unusual in the southeast part of the floor.

Alika K. Herring of South Gate, Calif. has submitted excellent drawings of Plato

on May 11, 1954, at 10°.9, on June 11 at 29°.4, and on July 10 at 23°.6, employing an 8-inch reflector at powers of 309X to 588X. He clearly saw four craterlets as such, A, C, and the twins D; the twins were very clearly separated, creditable performance for an aperture of 8 inches. On June 11 a hillock was observed near the edge of the shadow of the west wall, and on that date the diffuse Spot B was seen with difficulty. Under the very low lighting prevailing on May 11 C and the twins D were seen to have very broad outer walls. On June 11 and July 10 the whitish triangular sector in the southeastern part of the floor was readily visible. The separation of the twins D is an excellent test of resolving power.

Peirce and Peirce A. D. P. Avigliano made an extensive series of observations of these two craters in April, 1953 with 6-inch and 8-inch reflectors. These craters may be found on the surface of the Mare Crisium on Section XII of the Wilkins map, Peirce A being the smaller and more northern of the two. Mr. Avigliano observed from soon after lunar sunrise on these objects at colongitude 307°.7 on April 17 (U. T. as usual) to past lunar noon at colongitude 94°.0 on April 29. We remind our newer readers that colongitude is the lunar eastern longitude of the sunrise terminator. It measures the solar illumination of a given lunar area and is roughly indicative of phase, being 270° at new moon, 0° at first quarter, 90° at full moon, and 180° at last quarter, on the average. Under low morning lighting Mr. Avigliano saw Peirce as a crater with a dusky interior and a raised rim, deep enough to be about one-half full of shadow on April 18, 1953 at colongitude 320°.1. On April 19 and 21 Peirce exhibited a small central peak, a deep crater in the southwest part of the floor, and some detail on the northeast rim. Peirce A is so remarkably deep that it was still almost half full of shadow on April 21 at 357°.1. By this time each crater was surrounded by a darker area, and a bright ray from Proclus came between the two. By April 25 at 46°.6 the craters were seen as white spots only, and on April 29 at 94°.0 Peirce A was invisible. In a similar fashion the true outlines of the twin craters Messier and W. H. Pickering are impossible to trace under high lighting.

Possible Fault Near Tycho. On November 15, 1953 at colongitude 25°.6 Mr. Howard G. Allen of Coatesville, Penna. with a 6-inch reflector observed a black line of shadow running southwest from Tycho H and, after a break, connecting to the north rim of Tycho. He wonders whether we may here have a geological fault similar to the Straight Wall. This Tycho object is not shown on the Wilkins map, and it should hence be looked for. The best times will be near colongitude 20° in the morning and near 180° in the evening. Tycho and H are on Section XXIII of the Wilkins map.

Pico. Mr. Allen drew this famous mountain, located south of Plato on Section XV of the Wilkins map, on July 17, 1954 at 109°.3 with his 6-inch reflector at 180X and 300X and fairly good seeing. The lighting being near noon, the shape of Pico differed greatly from that on maps and on low-lighting photographs. Walter H. Haas had this same experience when studying Pico with a 6-inch reflector and a 10-inch refractor in 1938. Mr. Allen drew a round, bright spot in the west central part of Pico and compared it in sharpness and brightness to Spot C in the southeastern part of the floor of Plato. He conjectures that this Pico spot is, like C, a craterlet. Haas drew it as a spot on April 14 and June 14, 1938 at colongitudes 76°.5 and 105°.5 respectively.